

Chapter 6. Project Evaluations

This chapter describes the funding scenarios and the results of the MoveAZ performance analysis. As described in Chapter 5, individual projects were packaged into corridor-level bundles for evaluation in the MoveAZ plan. Using base and future year system performance results as a benchmark, the MoveAZ Plan evaluated the benefits of each project bundle on future year system performance, reported by each performance measure and factor. Bundles were then packaged into funding scenarios based on the ADOT estimates of available funding and the total performance score received by a bundle.

■ 6.1 Funding

The MoveAZ performance evaluation process begins with an examination of the total funding available to construct major state transportation projects. Identifying available funding sets the ultimate constraint on the projects identified in MoveAZ. This section describes the process used to estimate funding available for major projects over the course of the plan from 2010 through 2025. The plan begins in 2010 to accommodate ADOT's existing funding commitments to specific projects that are described in the *Five-Year Transportation Facilities Construction Program* (five-year program).

The five-year program is a list of capital transportation projects for which ADOT has identified funding. This program is generated through the coordinated efforts of several ADOT divisions and adopted by the Arizona Transportation Board each year. Each year, new projects are added to the fifth year of the five-year program. The next program cycle, 2006 to 2010, will include projects analyzed in MoveAZ. The process of transitioning from MoveAZ to the five-year programming process is described in more detail in Chapter 9.

To estimate the available funding for projects, three funding scenarios for three funding regions were evaluated. Funding levels were also estimated separately for subprograms and major projects in each region, in accordance with existing ADOT programming practice.

Funding Scenarios

The MoveAZ Plan used three investment scenarios based upon estimates of state and Federal funds available to Arizona, as determined by ADOT Financial Management Services. The three scenarios were:

1. **Constrained** – A projection of currently available funding sources through 2025;
2. **Reasonably anticipated revenues** – An increase above the constrained scenario based on a reasonable increase in revenues that could be derived from Federal and/or state sources; and
3. **Unconstrained** – No financial constraints, including all projects that address specific needs on the state highway transportation system, as identified in previous planning processes.

The constrained scenario represented funding that will likely be available to the State for future programming through 2025. The reasonably anticipated revenues provide a means to describe the additional performance gains that could be derived from a modest increase in transportation funding. Table 6.1 shows total funding available in each of these two scenarios.

Table 6.1 Available Funding for MoveAZ by Scenario

Scenario	Funding (\$M 2004)
Constrained	\$8,975
Reasonably Anticipated Revenues	\$10,958
Potential Increase in Funding	\$1,983

Source: Arizona Department of Transportation, 2004.

Funding Regions

MoveAZ follows current Board policy by dividing funding and conducting performance analysis independently for three major regions of the State: 1) Maricopa County, 2) Pima County, and 3) the 13 other counties. Maricopa County receives 37 percent of state funding, Pima receives 13 percent, and the 13 other counties receive 50 percent. MoveAZ used this existing funding split to determine the level of funding for each region through 2025.

Subprogram and Major Project Funding

The final step for identifying funding available for project bundles involves estimating the split between subprogram and major project funding. ADOT funds many transportation improvements through subprograms that address key functional areas, such as pavement and bridge maintenance, safety, district-identified minor projects, and others. These subprograms are funded as a whole, with the relevant projects identified by individual

subprogram managers and analyzed using subprogram-specific tools and performance measures. For example, the ADOT pavement management system identifies roadway segments that require repaving and estimates the cost to maintain a particular pavement condition standard.

The Arizona Transportation Board sets the level of funding available to each subprogram. In recent years, these funding levels have been fairly stable. For the purpose of the MoveAZ Plan, the total funding available for subprograms was assumed to be constant each year and consistent with established funding levels. Table 6.2 shows funding for subprograms for each of the three major regions.

Table 6.2 Annual Funding for Subprograms by Region

County	Yearly Funding (\$M)
Maricopa	\$30.5
Pima	\$18.5
13 Other Counties	\$171.0
Total	\$220.0

Source: Arizona Department of Transportation, 2004.

The total funding available for major projects for each region from 2010 to 2025 was derived by estimating total funding, allocating it among the three major regions using the regional distribution described above, and subtracting total subprogram funding in each region over the same period. The total major project funding identified using this process is shown in Table 6.3.

Table 6.3 Total Funding for Major Projects and Subprograms by Region, 2010-2025 (Constrained Scenario)

County	Funding for Major Projects (\$M)	Funding for Subprograms (\$M)	Total (\$M)
Maricopa	2,832.7	488.0	3,320.7
Pima	870.7	296.0	1,166.7
13 Other Counties	1,751.7	2,736.0	4,487.7
Total	5,455.1	3,520.0	8,975.1

Source: Arizona Department of Transportation, 2004.

■ 6.2 Project Performance Results

MoveAZ project bundles were evaluated on the seven performance factors described in Chapter 4. Projects were evaluated separately for Pima County and the 13 other counties to be consistent with the separate funding streams identified for each region. The plan does not include an evaluation of projects for Maricopa County. These projects are identified as part of the State Transportation Board adopted by MAG RTP. The results of the MoveAZ analysis, as well as the projects identified in the MAG RTP, are organized here by the three funding scenarios described above.

Constrained Revenue Scenario

The constrained revenue scenario presents projects that performed the best in the analysis process. Table 6.4 presents the projects in this scenario for each of the regions. Except for Maricopa County, these projects were analyzed using MoveAZ performance measures and factors. Maricopa projects were analyzed as part of MAG RTP and not using the MoveAZ process. The locations of the constrained scenario projects in Pima County and the 13 other counties are shown in Figure 6.1. Planned state highway improvements for Maricopa County are shown in Figure 6.2.

Table 6.4 MoveAZ Plan Projects – Constrained Scenario

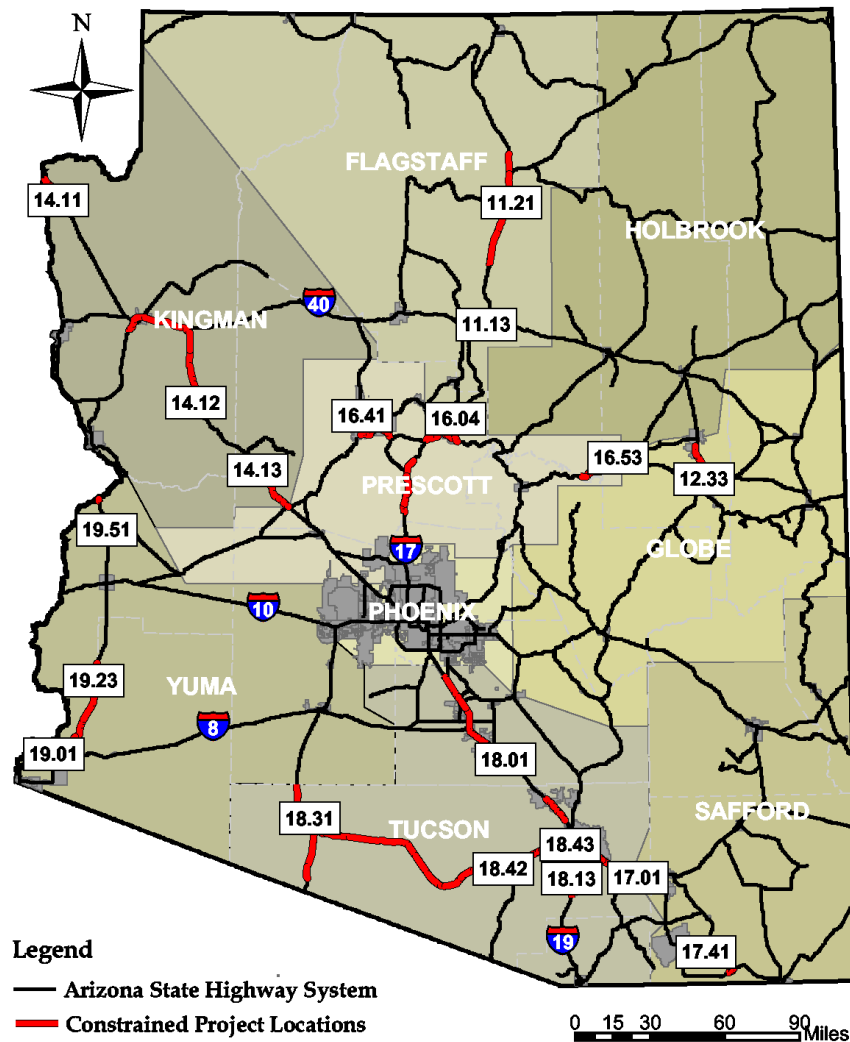
Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in Pima County</i>						
18.02	I-10	240	252	Widen roadway to 8 lanes, construct interchanges	38	\$159
18.04	I-10	262	275	Widen roadway to 6 lanes	24	\$43
18.43	SR 86	150	171	Widen roadway to 4 lanes (10 miles) and 6 lanes (11 miles)	21	\$22
18.13	I-19	63	91	Widen roadway to 6 lanes (16 miles), add auxiliary lanes (12 miles)	19	\$300
18.03	I-10	275	288	Widen roadway to 6 lanes, reconstruct bridge	19	\$36
17.01	I-10	288	303	Widen roadway to 6 lanes	18	\$23
18.42	SR 86	92	141	Reconstruction roadway to standards	16	\$61
18.41	SR 86	52	92	Reconstruct roadway to standards	15	\$122
18.31	SR 85	32	80	Reconstruct roadway to standards	12	\$86

Table 6.4 MoveAZ Plan Projects – Constrained Scenario (continued)

Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in the 13 Other Counties</i>						
16.21	SR 69	281	296	Widen to 6 lanes	47	\$49
14.02	I-40	44	45	Widen to 6 lanes, reconstruct or improve 3 interchanges, noise barriers	42	\$142
14.11	U.S. 93	2	17	Widen to 4 lanes	36	\$47
17.51	SR 92, SR 90	321	325	Widen to 6 lanes, raised median	36	\$14
14.12	U.S. 93	92	121	Reconstruct as a 4-lane divided roadway, new interchanges	36	\$250
19.23	U.S. 95	31	70	Widen to 4 lanes, replace bridge	35	\$117
14.13	US 93	161	182	Reconstruct as a 4-lane divided roadway	33	\$85
14.03	I-40	55	71	Widen to 6 lanes, reconstruct two interchanges	32	\$107
16.51	SR 260	208	228	Widen to 4 lanes, raised median (14 miles), reconstruct (6 miles)	31	\$122
16.41	SR 89	314	330	Widen to 4 lanes, some segments with turn lanes	31	\$44
17.52	SR 92	352	354	Widen to 4 lanes, some segments with turn lanes	30	\$6
11.13	I-40	195	205	Reconstruct roadway, widen some segments to 6 lane, noise barriers	30	\$41
16.04	I-17	286	298	Widen to 6 lanes	28	\$82
18.01	I-10	175	226	Widen to 6 lanes	28	\$163
16.03	I-17	278	286	Widen to 8 lanes	26	\$80
17.41	SR 90	322	336	Widen to 4 lanes, some segments with turn lanes	26	\$45
12.33	SR 77	342	358	Widen to 4 lanes, implement Rural ITS system	26	\$51
19.51	SR 95	131	147	Construct passing lane segments, widen a one-mile segment to 6 lanes	25	\$7
16.53	SR 260	282	302	Reconstruct roadway, widen a 5-mile segment to 4 lanes	25	\$104
16.02	I-17	244	262	Widen to 6 lanes, implement ITS system	22	\$61
11.21	U.S. 89	442	482	Widen to 4 lanes, raised median, 3 new interchanges, some segments with turn lanes	21	\$130
19.01	I-8	2	12	Widen to 6 lanes, reconstruct interchanges and bridges	21	\$55

Note: Projects in Maricopa County include projects funded from both state and regional sources.

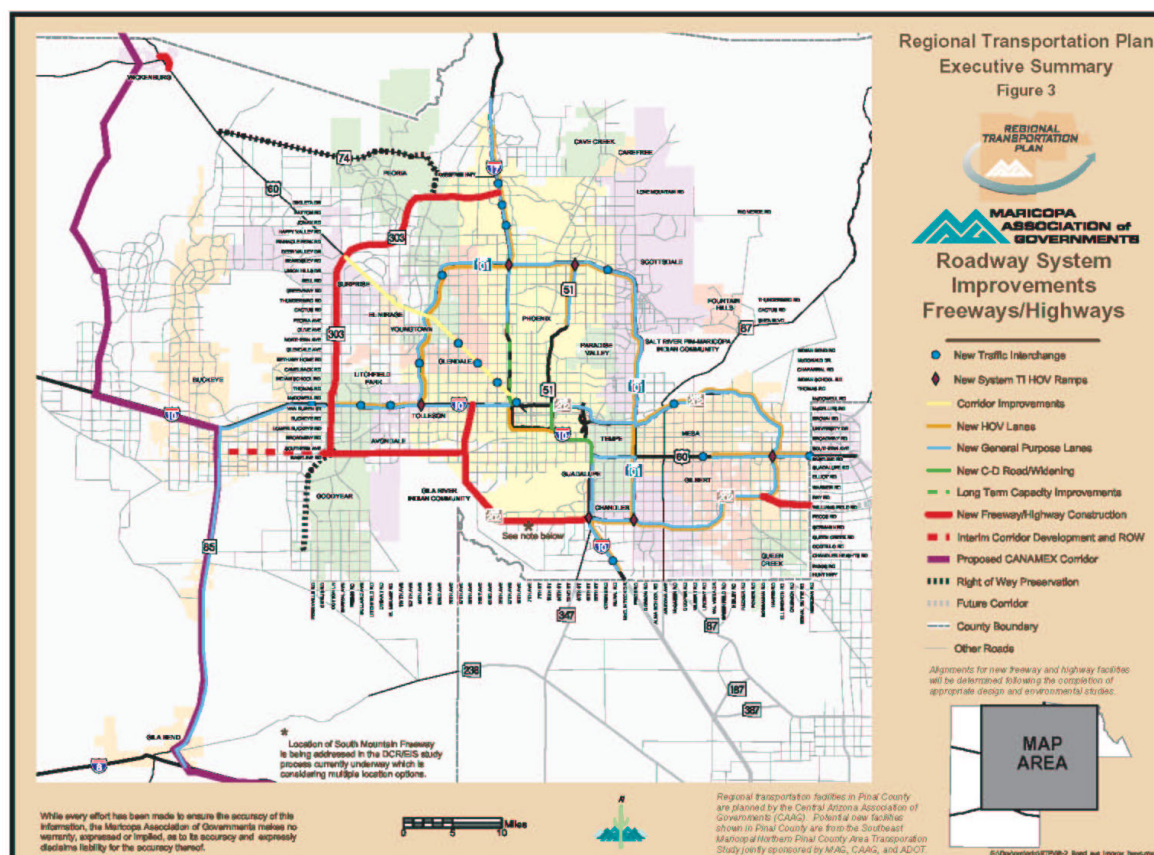
Figure 6.1 Constrained Scenario Project Locations (Pima County and the 13 Other Counties)



Additional Expected Revenues

The second scenario examines the additional projects that might be built if ADOT were to identify new state or Federal funding sources. This scenario was estimated at roughly \$2 billion in additional funding. This funding was split between major projects and sub-programs, as described in Section 6.1. Table 6.5 shows the additional funding that would be available to each region in this scenario.

Figure 6.2 Constrained Scenario Project Locations (Maricopa County)



Source: Adapted from Maricopa Association of Governments' Regional Transportation Plan, 2003. Includes projects funded from Federal, state, and regional sources.

Table 6.5 Total Funding for Major Projects and Subprograms by Region, 2010-2025 (Additional Revenue Scenario)

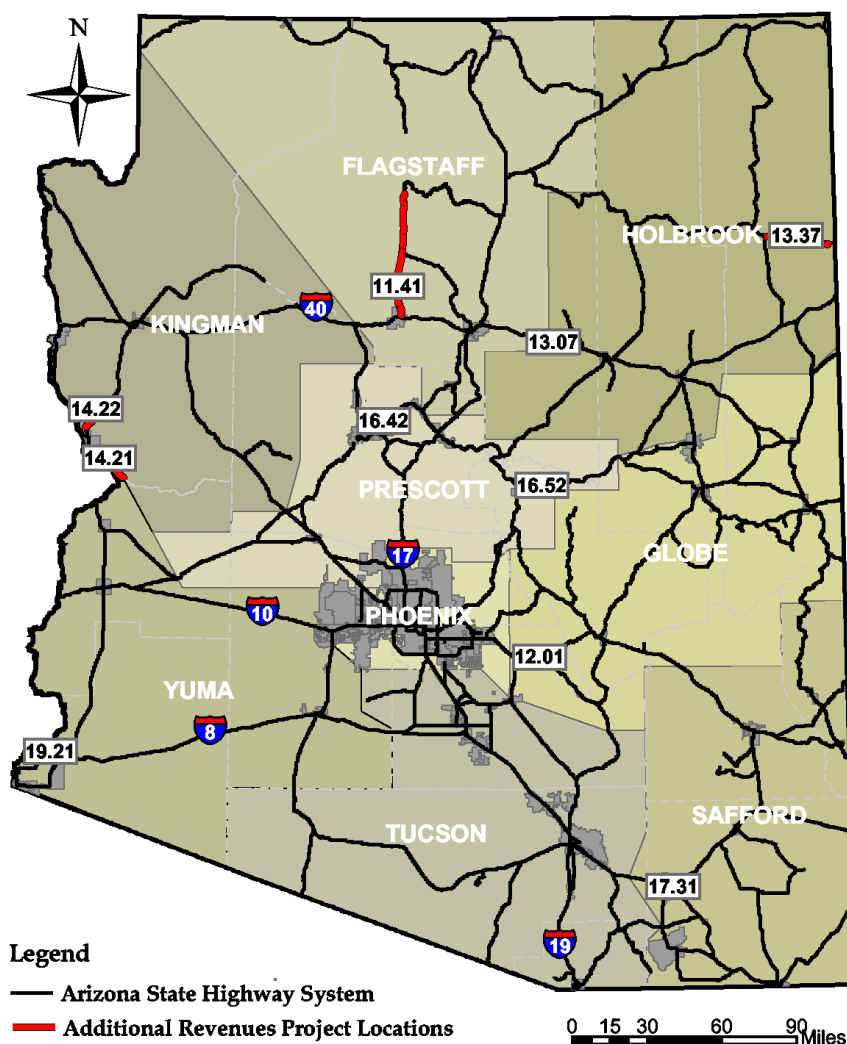
County	Funding for Major Projects (\$M)	Funding for Subprograms (\$M)	Total (\$M)
Maricopa	626	108	734
Pima	192	65	258
13 Other Counties	387	605	992

The additional projects funded in this scenario are shown in Table 6.6. The locations of the additional revenue scenario projects are shown in Figure 6.3.

Table 6.6 MoveAZ Plan Projects – Additional Revenue Scenario

Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in the 13 Other Counties</i>						
16.42	SR 89A	320	329	Widen to 4 lanes	20	\$29
13.07	I-40	230	233	Reconstruct, widen to 6 lanes, reconstruct 3 interchanges	20	\$52
13.37	SR 264	446	473	Widen to 4 lanes, raised median, some segments with turn lanes, replace bridge, construct bus turnout	19	\$52
16.52	SR 260	256	282	Widen to 4 lanes	18	\$15
17.01	I-10	288	303	Widen to 6 lanes	18	\$23
12.01	U.S. 60	212	226	Widen to 5 lanes (2 miles), construct new bypass (2 miles), construct 2 interchanges	17	\$51
17.31	SR 80	294	299	Add turning lanes, widen some segments to 4 lanes, reconstruct SR 80/I-10 interchange	17	\$38
14.22	SR 95	175	202	Widen to 4 lanes at selected locations (14 miles total)	16	\$42
19.21	U.S. 95	26	31	Widen to 6 lanes	16	\$19
11.41	SR 64	185	235	Add paved shoulders, widen some segments to 4 lanes (5 miles) and add turn lanes (1 mile), construct several passing lanes	15	\$47
14.21	SR 95	163	172	Construct passing/climbing lanes, new signage	14	\$2

**Figure 6.3 Additional Revenue Scenario Project Locations
(13 Other Counties Only)**



Unconstrained Scenario

The MoveAZ performance analysis process is based on an assessment of a large number of projects intended to address transportation needs across the State. Because funding is limited, not all of these projects can realistically be constructed in the timeframe of a long-range plan. The unconstrained scenario is designed to identify projects that did not perform, as well as other major projects, but were identified through previous needs assessments conducted by ADOT. Table 6.7 presents the projects in the unconstrained scenario.

Table 6.7 MoveAZ Plan Projects (Unconstrained Scenario)

Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in the 13 Other Counties</i>						
19.31	SR 72	13	49	Add paved shoulders, improve vertical/horizontal curves on some segments	14	\$59
13.35	SR 264	411	439	Construct climbing lane segments, add passing lanes (1 mile), improve intersection, construct bus turnout	13	\$27
11.02	I-17	333	340	Widen to 6 lanes, reconstruct interchange	13	\$35
11.24	U.S. 89A	579	613	Construct passing lane segments, widen some segments to 4 lanes (3 miles), construct bus turnout	13	\$14
17.22	U.S. 191	111	121	Widen to 5 lanes	13	\$34
18.51	SR 87	134	141	Widen to 4 lanes, reconstruct interchange	13	\$38
13.24	U.S. 191	420	446	Reconstruct roadway, add shoulders (14 miles), and widen some segments to 4 lanes (5.5 miles)	13	\$62
13.41	SR 77	362	387	Construct climbing lanes, rehabilitate 4 bridges	12	\$14
19.53	SR 95	110	131	Reconstruct roadway to standards	12	\$11
13.03	I-40	282	289	Widen some segments to 6 lanes, construct noise barriers	12	\$19
19.61	SR 195			Construct 3 interchanges to make SR 195 a controlled access facility	12	\$30
13.36	SR 264	441	446	Widen to 4 lanes, raised median (3 miles), turn lanes (3 miles), construct bus turnout	12	\$16
13.25	U.S. 191	446	510	Add paved shoulders, widen some segments to 4 lanes (14 miles) with turn lanes in several locations (2 miles)	12	\$94
12.04	U.S. 60	336	402	Add paved shoulders, widen some segments to 4 lanes, with some turning lanes	12	\$49
14.04	I-40	71	89	Reconstruct roadway (8 miles), add climbing lanes on some segments	11	\$34
12.31	SR 77	153	171	Improve shoulders and construct climbing lane segments	11	\$11
13.32	SR 264	340	388	Add paved shoulders, construct climbing lanes (6 miles), turn lanes (2 miles), improve curves at 14 locations, and 4 intersections	11	\$51

Table 6.7 MoveAZ Plan Projects (Unconstrained Scenario) (continued)

Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in the 13 Other Counties (continued)</i>						
11.01	I-17	298	322	Construct climbing lanes on some segments, reconstruct interchanges and bridges	11	\$110
12.43	SR 260	331	338	Widen to 5-lane cross-section	11	\$12
13.34	SR 264	386	411	Add paved shoulders, construct climbing lane segments, widen some segments to 4 lanes (5 miles), add turning lanes (6.5 miles), construct bus turnout	11	\$32
11.23	U.S. 89	531	556	Improve shoulders, construct passing lane segments (2 miles) and 4 lane segments (2 miles)	11	\$18
14.05	I-40	91	120	Reconstruct roadway, widen some segments to 6 lanes (18 miles), reconstruct two interchanges	11	\$111
17.23	U.S. 191	130	144	Construct climbing lane segments, construct bypass (5 miles)	11	\$22
13.04	I-40	292	311	Reconstruct roadway	10	\$75
17.12	U.S. 70	335	349	Widen to 4 lanes, raised median, some segments with turn lanes	10	\$19
13.21	U.S. 191	344	365	Reconstruct roadway, add passing lane	10	\$52
11.32	U.S. 160	321	323	Widen to 5 lanes, add paved shoulders (1 mile)	10	\$27
12.61	SR 79	132	150	Widen to 4 lanes	10	\$60
12.11	U.S. 70	253	287	Add shoulders, widen some segments to 4 lanes with occasional turning lanes, lengthen passing lane (0.5 mile)	9	\$66
11.51	SR 264	322	340	Add paved shoulders, widen some segments to 5 lanes (1 mile), construct climbing lane segments and bus turnout	9	\$18
13.05	I-40	311	339	Reconstruct roadway and one interchange	9	\$127
13.23	U.S. 191	379	412	Reconstruct roadway, add passing lane (1 mile)	9	\$133
13.06	I-40	339	360	Reconstruct roadway, reconstruct 2 interchanges	9	\$113
18.22	SR 77	92	95	Construct climbing/passing lanes at selected locations	9	\$1
11.31	U.S. 160	336	343	Construct passing and climbing lanes	8	\$2

Table 6.7 MoveAZ Plan Projects (Unconstrained Scenario) (continued)

Project	Road	BMP	EMP	Description	Score	Cost (\$M)
<i>Projects in the 13 Other Counties (continued)</i>						
17.24	U.S. 191	154	165	Widen shoulders, raise bridge	8	\$25
17.25	U.S. 191	23	27	Reconstruct roadway, widen to 4 lanes	8	\$14
11.11	I-40	155	165	Reconstruct segments (2 miles)	8	\$14
17.61	SR 266	104	123	Widen shoulders	8	\$5
12.21	SR 73	310	335	Widen shoulders	8	\$13
14.01	I-40	37	44	Reconstruct and widen to 6 lanes, reconstruct two interchanges	7	\$63
14.06	I-40	123	144	Reconstruct roadway	7	\$86
13.11	U.S. 160	361	384	Add passing lanes at selected locations	7	\$7
18.61	SR 287	134	142	Widen to 4 lanes, construct 2 new interchanges	7	\$56
12.06	U.S. 60	252	337	Construct selected passing and climbing lane segments	7	\$28
11.22	U.S. 89	498	504	Construct passing lanes	6	\$2
13.22	U.S. 191	370	379	Reconstruct roadway	5	\$24
17.26	U.S. 191	45	65	Reconstruct roadway	5	\$77
12.03	U.S. 60	260	273	Construct selected passing and climbing lane segments	3	\$2
12.51	SR 277	331	336	Widen to 5 lanes	3	\$26
11.16	I-40	226	233	Reconstruct roadway, add some climbing lane segments, reconstruct traffic interchange	2	\$25
17.02	I-10	310	325	Construct selected climbing lane segments	2	\$21
17.11	U.S. 70	287	329	Repair shoulder segments, move headwalls	2	\$11
19.02	I-8	17	20	Add paved shoulders	2	\$2
19.52	SR 95	147	161	Add turn lane, new signage	2	\$32
12.42	SR 260	317	335	Construct selected passing/climbing lane segments, add paved shoulders	1	\$3
17.21	U.S. 191	87	104	Widen shoulders	1	\$9
11.12	I-40	167	196	Construct climbing lane (1 mile), reconstruct 4 interchanges, widen 2 bridges, construct noise barriers	0	\$84
17.71	SR 366	136	143	Reconstruct as a paved roadway	0	\$15

■ 6.3 State Performance Results

In addition to analyzing the performance impact of project bundles, ADOT assessed the overall system performance of the constrained and additional revenue scenarios. These assessments are based on a slightly more limited set of the same performance measures used to evaluate project performance. Some measures, such as project consistency with RTPs, lack natural baselines and, therefore, cannot be included in the state performance analysis. The purpose of these results is to measure how much can be done to maintain system performance at current levels, the general threshold specified in the MoveAZ Plan. Table 6.8 shows expected system performance for the 2002 base, 2025 base (without MoveAZ projects), the constrained scenario, and the additional revenue scenario.

From 2002 to 2025, Arizona will face significant challenges to its ability to maintain system performance. Rapid population growth will fuel demand for travel in the State, creating mobility, connectivity, environmental, and other concerns. Some of the greatest impacts are expected in the area of mobility. Without new investment, less than 40 percent of all motor vehicle travel will occur in free-flow conditions in 2025, compared to nearly three-quarters of all motor vehicle travel in 2002. Delay per trip will jump from just over a minute per trip to seven minutes per trip. Although this may seem insignificant, motorists will experience greater delays at peak periods in urbanized areas. Delay resulting from incidents, such as crashes, will more than triple.

On high-priority corridors in the State, increases in travel time will vary. Some corridors, such as Flagstaff to Page and Phoenix to Globe, will see only moderate increases. Others, such as Phoenix to the Hoover Dam along U.S. 93, will see travel times nearly double. The ability to pass in major two-lane corridors – the other measure of connectivity – will become roughly 50 percent more difficult in 2025 than in 2002.

Increased traffic will also substantially increase fuel consumption and vehicle emissions, and reduce the bicycle suitability of many of Arizona's roadways.

Using the performance measures designed to address the safety factor, safety will actually improve from 2002 to 2025. Although small increases in vehicles on a given roadway will increase the potential for crashes to occur, the massive volume of traffic expected in 2025 will reduce speeds enough to actually reduce the number of crashes that occur on the state system, as well as reducing the rate of injuries.

Constrained Scenario System Performance

Under the constrained scenario, system performance improves significantly across the State. This improvement is evident from every ADOT performance measure. Mobility improves substantially, with over one-half of all traffic expected to take place in free-flow conditions. Delay per trip is reduced to almost one-third of the 2025 level at 2.5 minutes per trip, and unexpected delay is reduced by more than one-half.

Table 6.8 System Performance Results for Constrained and Additional Revenue Scenarios

Measure	2002 Base	2025 Base	Constrained Scenario	Additional Revenue Scenario
Mobility factor				
% PMT at LOS A-C or D (rural or urban)	77%	38%	54%	55%
Average delay per trip (minutes:seconds)	1:17	6:58	2:29	2:28
Reliability factor				
Unexpected delay (minutes:seconds)	0:48	3:11	1:27	1:27
Safety				
Crash rate per 100 million VMT	421.0	415.7	411.2	411.4
Injury rate per 100 million VMT	157.1	155.8	153.7	153.8
Accessibility				
Average bike suitability (24-point scale)	12.9	11.6	12.0	12.2
Moderate bike suitability (12-18%)	56%	48%	40%	39%
High bike suitability (19-24%)	23%	14%	16%	17%
Resource conservation				
Emissions (tons per day)	771	1,288	1,265	1,265
Fuel consumption (1,000 gallons per day)	4,304	11,888	10,747	10,747
Connectivity				
Passing ability (LOS ratio)	0.82	1.23	1.16	1.13
Intercity connectivity (total travel time by corridor)				
Douglas – Benson (SR 80)	2:12	2:34	2:32	2:32
Phoenix – Hoover Dam	4:48	7:57	7:46	7:46
Flagstaff – Page	2:26	2:27	2:27	2:27
Phoenix – Globe	1:03	1:04	1:04	1:03
Phoenix – Lukeville	2:31	4:35	4:30	4:30
Phoenix – Mogollon Rim	3:14	4:48	4:48	4:48
Prescott – I-17 (Cordes Junction)	0:47	1:20	0:42	0:42
Yuma – Bullhead City	3:47	4:00	3:59	3:59
Tucson – Holbrook	4:33	4:45	4:45	4:45

Base (2002) to Base Future (2025) System Performance

Under the constrained scenario, both the crash and injury rates are reduced below the 2025 baseline. This slower increase – not an absolute reduction – likely results from the reconstruction of several roadways as divided highways and the addition of shoulders to other roads.

Average bike suitability of state routes improves moderately, although this improvement is concentrated at the low and high ends of the bike suitability scale. An additional two percent of roadway miles move into the highly suitable category, while the average suitability in the low category improves.

Emissions and fuel consumption are also both reduced slightly by the constrained scenario, relative to the 2025 base scenario. With thousands of new vehicle miles traveled everyday, however, it is difficult to provide substantial improvements to these measures. Furthermore, when speeds are improved substantially (e.g., above 45 miles per hour), both fuel consumption and emissions begin to increase.

Finally, both measures of connectivity improve under the constrained scenario. Passing ability shows a roughly six percent improvement, while several of the corridors show small improvements in travel time. One corridor, from Prescott to I-17 (Cordes Junction), is expected to improve to better than the 2002 travel time. This corridor, the shortest of the corridors evaluated, would be affected by major improvements to SR 69, including widening the roadway to six lanes. Roadway widening will substantially reduce congestion in the corridor.

Additional Revenue Scenario

Under the additional revenue scenario, roadway performance improves moderately over the constrained revenue scenario. The additional revenue scenario differs in an important aspect from the constrained scenario, however, in that it includes only projects outside Maricopa and Pima Counties. For Maricopa, the MAG RTP included only a constrained scenario in compliance with Federal regulations. However, if funding in the additional revenue scenario becomes available, needs exist in the MAG area to fully utilize the new funding. In Pima County, all projects identified by previous planning studies were fundable under the constrained scenario. Although the region will undoubtedly have additional needs by 2025, no specific projects have been identified at this time and consequently no additional projects are included for the Pima Association of Governments (PAG) region in the additional revenue scenario. Future planning efforts by ADOT, MAG, and PAG will be used to identify specific projects that would be considered for this scenario.